Claims

We claim:

1. A selectable sub-reflector antenna system, comprising:

a main reflector unit;

a sub-reflector unit disposed apart from the main reflector unit and having at least one cavity;

at least one fluidic dielectric having a permittivity and a permeability;

at least one composition processor adapted for dynamically changing a composition of said fluidic dielectric to vary at least one of said permittivity and said permeability in said at least one cavity; and

a controller for controlling said composition processor to selectively vary at least one of said permittivity and said permeability in said at least one cavity in response to a control signal.

2. The antenna system of claim 1, wherein said at least one cavity comprises a plurality of cavities.

3. The reflector antenna of claim 2, wherein the plurality of cavities comprises a plurality of concentric tubes consisting of quartz capillary tubes.

4. The antenna system of claim 1, wherein the main reflector unit comprises a reflector portion surrounded on its periphery by at least one cavity capable of being changed with the composition of fluidic dielectric by the at least one composition processor.

5. The antenna system of claim 1, wherein the main reflector unit is a solid dielectric substrate.

6. The antenna system of claim 2, wherein each of said at least one composition processor is independently operable for adding and removing said fluidic dielectric from each of said plurality of cavities.

7. The antenna system according to claim 1, wherein said fluidic dielectric is comprised of an industrial solvent.

8. The antenna system according to claim 7, wherein said fluidic dielectric is comprised of an industrial solvent that has a suspension of magnetic particles contained therein.

9. The antenna system according to claim 8, wherein said magnetic particles are formed of a material selected from the group consisting of ferrite, metallic salts, and organo-metallic particles.

10. The antenna system according to claim 1, wherein the antenna system further comprises at least one feed horn spaced between the main reflector unit and the sub-reflector unit for generating a radiated signal that is selectively reflected from the sub-reflector unit towards the main reflector unit using the fluidic dielectric.

11. The antenna system according to claim 10, wherein the antenna system further comprises at least one feed horn spaced above the sub-reflector unit for generating a radiated signal that is selectively transmitted through the sub-reflector unit towards the main reflector unit.

12. A selectable sub-reflector antenna system, comprising:

a main reflector unit;

a sub-reflector unit disposed apart from the main reflector unit and having at least one cavity;

at least one fluidic dielectric having a permittivity and a permeability; and

at least one fluidic pump unit for moving said at least one fluidic dielectric among at least one cavity and a reservoir for adding and removing said fluid dielectric to said at least one cavity in response to a control signal.

13. The antenna system of claim 12, wherein said at least one cavity comprises a plurality of cavities.

14. The reflector antenna of claim 13, wherein the plurality of cavities comprises a plurality of concentric tubes consisting of quartz capillary tubes.

15. The antenna system of claim 12, wherein the main reflector unit comprises a reflector portion surrounded on its periphery by at least one cavity capable of being changed with the composition of fluidic dielectric by the at least one pump unit.

16. The antenna system according to claim 12, wherein said fluidic

dielectric is comprised of an industrial solvent having a suspension of magnetic particles contained therein, wherein said magnetic particles are formed of a material selected from the group consisting of ferrite, metallic salts, and organo-metallic particles.

17. The antenna system according to claim 12, wherein the antenna system further comprises at least one feed horn spaced between the main reflector unit and the sub-reflector unit for generating a radiated signal that is selectively reflected from the sub-reflector unit towards the main reflector unit using the fluidic dielectric and further comprises at least one feed horn spaced above the sub-reflector unit for generating a radiated signal that is selectively transmitted through the sub-reflector unit towards the main reflector unit.

18. A method for selectively activating a sub-reflector in a reflector antenna system, comprising the steps of:

reflecting a first radiated signal from the sub-reflector from a first source toward a main reflector in a first mode wherein the sub-reflector is activated using at least a fluidic dielectric; and

transmitting a second radiated signal through the sub-reflector from a second source toward the main reflector in a second mode wherein the sub-reflector is inactivated at least in part by changing the fluidic dielectric.

19. The method of claim 18, wherein the step of changing the fluidic dielectric comprises the step of removing the fluidic dielectric from at least one cavity in the sub-reflector.

20. The method of claim 18, wherein the method further comprises the step of dynamically adding and removing a fluidic dielectric to at least one cavity within the main reflector unit to vary a propagation delay of said radio frequency signal.

21. The method according to claim 20, further comprising the step of selectively adding and removing a fluidic dielectric from selected ones of a plurality of said cavities of the reflector antenna in response to a control signal.

22. The method according to claim 21, wherein the step of selectively adding and removing a fluidic dielectric comprises the step of mixing fluidic dielectric to obtain a desired permeability and permittivity.